Mr. John Mott-Smith *4 March 2005*
Director of Voting Systems
Office of the Secretary of State
1500 11th Street
Sacramento, California

Subject: Certification Report for updates to the Sequoia Voting Systems, Inc, Optech Optical Mark-Sense Voting System Consisting of:

Election Management System (EMS) 3.54.1 (release date 12/07/04)
Automatic Election Return Operation (AERO) 3.54.1 (release date 12/07/04)
Optech 400-C, Model 2.02 with Election Tabulation Program (WinETP) 1.10.5
Optech Insight Precinct Tabulator Hardware Version 1.01, Firmware Version HPX1.40/APX2.06/CPX1.12
Optech Eagle III-P Precinct Tabulator (previously certified)
Memory Pack Reader (MPR) Version 2.15
Smart Pack Reader (SPR) Host Version 1.04

Executive Summary

State certification testing was conducted at Sequoia Voting Systems (SVS) facilities in Oakland, CA, on 22-24 February 2005. The system tested consists of an upgrade to the election management and reporting system, Election Management System/ Automatic Election Return Operations (EMS/AERO) 3.54.1 (11/12/04). EMS/AERO has been rewritten to meet the 2002 Voting System Standards (VSS) and eliminate some older supported systems. EMS/AERO supports the following optical mark ballot scanners:

a. The Optech 400-C, a high-speed, high-volume optical mark ballot scanner used for centralized ballot counting supported by the updated Election Tabulation Program (WinETP) 1.10.5 firmware release. The Optech 400-C is typically used for absentee ballot counting and high-speed/high-volume recounting.
b. The previously qualified Optech Eagle III-P Precinct Counter, and
c. The Optech Insight Precinct ballot counters. The Insight, new to California, is an upgrade from the older Optech Eagle III-P with visible light sensors.

The interface between the ballot scanners and the EMS/AERO uses either the Memory Pack Reader (MPR), updated to Version 2.15, or the Smart Pack Reader (SPR) which supports telephone modem updates to the centralized AERO for reporting election results.

The testing indicated the Sequoia Optical Mark-Sense Voting System version as configured in this test is compliant with the California Election Code with the following caveats:

1. The networked Optech 400-C configuration with multiple Optech 400-C automatically updating a master WinETP program consolidated results database was not tested at this time.
2. The Unvoted Contest Warning feature of EMS/AERO/Insight failed to work correctly for this test; it was to be retested the following week in the public test and recommendations reported in the staff report. Its use may be inconsistent between voters as implemented.
3. Obsolete utilities CVT.EXE, CHOICE.EXE, and AERO2EDS.EXE utilities are not ITA tested and qualified and are to be removed.
4. SVS is to designate a commercial utility (probably UltraEdit programming editor) to replace CVT.EXE/Notepad operations in support of EMS programming of the Primary election DTS requirements. SVS should provide or specify access controls limiting use of the
5. Modem uploads of the results are inherently unsecure and should only be used for unofficial results.
6. The WinETP canvass report, which was directed to not be used in the prior certification, correctly reported results in this version and should be available for use.

References:

[Ciber3.54] Ciber Report*, Software Qualification Test Report, Original Report for EMS/AERO Version 3.54,* 31 Nov 2002.

[Ciber3.54.1] Ciber Report,*[Draft] Sequoia Voting Systems Software Qualification Test Report, Addendum 1 for EMS/AERO Version 3.54.1,* 21 Jan 2005.

[SVS 400-C Sec], Sequoia Specification, *Sequoia Voting Systems Optech 400-C Release 400-C, Version 1.0*, Mar 2004

[Wyle1.02] Wyle Report No. 43343-01, *Test Report Qualification Testing of the Sequoia Pacific IV-C (Model 400-C) Ballot Counter Hardware Level 2.02, Firmware Level 1.02,* 27 Mar 2001.

[Wyle1.02b] Wyle Letter No. 43343B-07, *Optech IV-C (Model 400-C), Firmware Release 1.02b*, 25 Jun 2002.

[Wyle1.10.5] Wyle Report No. 50932-02, *[Draft] Change Release Report of the Optech 400-C Ballot Counter (WinETP Firmware Version 1.10.5)*, 1 Feb 2005.

[Wyle Insight] Wyle Report No. 4668502, *Hardware Qualification of the Sequoia Voting Systems Insight Optical-Mark Sense Precinct Tabulator (Firmware Release HPX1.40/APX2.06/CPX1.12), Rev A*, 25 Jun 2003

Qualifications

NASED Qualification for the Sequoia EMS/AERO 3.54.1, NASED # N-1-07-12-12-001 (1990), 01 Feb 2005, which includes the following component versions identified for this certification:

a. Optech 400-C Ballot Counter (1990 qualified)
b. WinETP Version 1.10.5 (2002 qualified).
c. Optech Eagle III-P (1990 qualified)
d. Optech Insight (1990 qualified)
e. EMS/AERO 3.54.1 (release date 12/07/04). (2002 qualified)
f. MPR Version 2.15
g. SPR Host Version 1.04

At the time of this report, a minor revision was expected in the final Wyle and Ciber reports for this qualification that provides a warning of the networking problem discovered in the Oregon testing.

General Description

In compliance with California Elections Code, Sequoia Voting Systems applied for certification for the following revisions and system components:

1. Optech 400-C, Model 2.02 (currently in use in California)
2. WinETP 1.10.5, Firmware for the OpTech 400-C (update from Firmware rel. 1.02b).
3. EMS/AERO 3.54.1 (release date 12/07/04) (update from EMS/AERO 3.53)
4. Optech Eagle III-P, Firmware HPS D/H 1.30.980428.1130, APS H 152.980428.1040, and CPS H 1.08A.980428.1150 (previously qualified with EMS/AERO 3.53). This model was included in the testing to check that it is compatible with the upgraded EMS/AERO.
5. Optech Insight, Hardware Version 1.01. Firmware HPX1.40, APX2.06, and CPX1.12.

The principal purpose for the certification test was to qualify upgrades to the Optech 400-C Central Count Tabulator firmware and EMS/AERO election support software package and to introduce the Optech Insight as an upgrade to the existing Optech Eagle III-P. There is no change to the Optech Eagle III-P itself but the changes to EMS/AERO will permit a modem upload through SPR-Host.

The Sequoia Optical Mark-Sense system in California uses the services of SVS to prepare the initial election definition and ballot layout. Definition files are imported to the EMS component or entered directly from ballot samples and the election parameters and report choices are selected to program the ballot counters. No native ballot layout capability is supported directly in the version tested.

Test Elections

(See attachment for more details)

Two elections were defined: Primary and General.

The test decks were verified by hand, then ran on an Optech 400-C as a Logic & Accuracy test. Later the primary deck was split between Optech Insight, and Optech Eagle III-P to test precinct tabulator design and the consolidation of results from multiple devices. The Primary test election used the 400-C, Insight, and Eagle to consolidate. The General Election (exercising the modem uplink) used two Insight tabulators.

The Primary election ran 2979 ballots in 10 precincts with 6 parties (three DTS reporting) and non-partisan
The General election ran 261 ballots exercising the modem connection including testing response to lost connections, reconnects, and contention between multiple competing calls.

The Optech ballots supported samples of the required languages in previous testing and were not examined for multiple languages in this test.

The system is a paper ballot based system so no audio support for ADA was required during the testing.

Security Considerations

Mark-sense ballot systems traditionally emphasize operational (procedural) and physical security as the security of the ballots themselves is critical. The risk of tampering is considered low as suspicious results can be checked by recounting the physical ballots and, if the ballots can be compromised, then there is no need to tamper with the system. However, attacks disrupting the election or raising doubt about the election results are possible and should be considered.

The Optech Mark-Sense Voting System security specification heavily emphasizes the procedural and physical security provisions including locking the equipment, controlling access, and keeping and using both internal and manual, external logs during operations. It also includes electronic signatures and checksum values for critical election files and results on the Optech 400-C and EMS/AERO. Checksums are claimed to be used on the modem connections. The EMS/AERO applications provides for dual passwords (potentially requiring a representative from two separate parties to enable access and operation) at the option of the local County Election Board (CEB). All passwords are optional and allow weak passwords by current best practice standards. Tests attempting to alter accessible files were detected and required the election to be reset.

First Security Agent (FSA)—Locking down the operating system environment

“SVS recommends a third party product, First Security Agent, for use to protect against unauthorized entry into the system with WinETP” [SVS 400-C Sec].

“First Security Agent works under any Windows platform and offers an administrator support for controlling which users are allowed to access the computer and the level of access each user may have“[ibid].

FSA can be a valuable aid for the Optech 400-C which uses Windows 98 SE; Windows 98 has little built in access security. FSA is less necessary with Windows 2000 which has a similar support as FSA built in. For this test, SVS installed FSA and setup Windows user accounts for administrator

and election worker access on both the Optech 400-C and EMS/AERO. [redacted] It allows very specific control on individual user accounts for individual executable programs, operating system functions such as file copy and directory access, and individual file access. [redacted] SVS needs to provide specific instructions and guidelines for setting up FSA with EMS/AERO and Optech 400-C if it is to be used.

During the testing, we discovered that unqualified utilities are still being included by SVS as part of the installation. These are CVT.EXE, CHOICE.EXE, and AERO2EDS.EXE. [redacted]

- [redacted]
- [redacted]

[redacted]

SVS has declared CVT.EXE, CHOICE.EXE, and AERO2EDS.EXE obsolete and proposes to remove or replace them. SVS proposes to replace CVT with UltraEdit, a programming editor from IDM Computer Solutions, Inc. Access controls or limits need to be set on getting to and using the editor and/or the .OFC file itself since this is outside any controls on the EMS application other than the procedural controls on EMS results.

SPR-Host Modem Upload. The SPR-Host modem upload of election results uses a modified XMODEM protocol with 16-bit Cyclic Redundancy Check (CRC). The link is configured to require the call to be initiated from the precinct by the Optech precinct counter (either the Eagle or the Insight models).to the central station consolidating totals. The protocol provides for checking the integrity of the message using CRC. We tested the connection using two precinct counters in the General election test attempting to simultaneously connect using the same telephone number. The connection was robust in detecting disconnects and switching from inactive to active connections without losing integrity of the results. [redacted]

Other Observations and Issues

1. The networked Optech 400-C configuration with multiple Optech 400-C automatically updating a master WinETP program consolidated results database was not included in the certification proposal and is not being recommended for use in California at this time.

2. Two other utilities which are reported in the ITA reports for WinETP are the 400-C Sort and Diagnostic programs. These were not included in the certification request for use in California and were not tested. The diagnostic program is prescribed in the California Use procedures as a pre-election tool for checking out the hardware; the diagnostic has been accepted for use in the past and is not, at this time expected to undergo certification. The sort utility is a new function that was not identified for use in California and should either be qualified for use or removed from the installation.

3. A problem was encountered with the candidate rotations. The candidate order in the contest list must match the base rotation order; when they didn't, the candidate order on the ballot was incorrect. This was more operator error than system error but should be part of the instructions for the California elections.

4. The Unvoted Contest Warning feature is intended to return the ballot to a voter if a contest designated in the EMS phase is left unvoted. The feature failed in testing because of an error in setup. In discussing the feature, we found that the feature is lower in precedence than the Blank Ballot and Overvote rejections. If the ballot is
   - rejected because it was either blank or had an overvoted race,
   - corrected/accepted by the voter, and then
   - resubmitted to the precinct counter,

   the precinct counter is expected to accept the ballot automatically even though the unvoted contest may not have been noticed and corrected by the voter. The voter has only one chance to correct all ballot marking problems even though the voter does not receive a warning about other problems. SVS was to investigate and retry the test the following week during the public part of the testing and the results reported in the staff report.

5. EMS/AERO reporting can support manually updating write-in totals for declared write-in candidates if the candidates are identified as AERO only write-in candidate so a counter is reserved for the results. Only 12 such counters can be included in a single election. Otherwise the write-in totals on the final canvass are submitted entirely manually.

6. The WinETP 1.10.5 Canvass Report problem was corrected with this release.

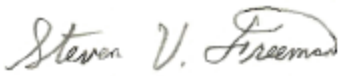
Conclusion

The testing indicated the Sequoia Optical Mark-Sense Voting System version as configured in this test is compliant with the California Election Code with the following caveats:

1. The networked Optech 400-C configuration with multiple Optech 400-C automatically updating a master WinETP program consolidated results database was not tested at this time.
2. The Unvoted Contest Warning feature of EMS/AERO/Insight failed to work correctly for this test; it was to be retested the following week in the public test and recommendations reported in the staff report. Its use may be inconsistent between voters as implemented.
3. Obsolete utilities CVT.EXE, CHOICE.EXE, and AERO2EDS.EXE utilities are not ITA tested and qualified and are to be removed.

4. SVS is to designate a commercial utility (probably UltraEdit programming editor) to replace CVT.EXE/Notepad operations in support of EMS programming of the Primary election DTS requirements. SVS should provide or specify access controls limiting use of the
5. Modem uploads of the results are inherently unsecure and should only be used for unofficial results.
6. The WinETP canvass report, which was directed to not be used in the prior certification, correctly reported results in this version and should be available for use.

Sincerely,



Steven V. Freeman

One Attachment:
Hardware Description with a list of the test configuration components.

Certification Testing of the
Sequoia Voting Systems'
Optical Mark-Sense Voting System
Optech 400-C with WinETP 1.10.5
EMS/AERO 3.54.1
Optech Eagle III-P
Optech Insight

Hardware Description

The tested configuration consisted of the following:

1. Ballot Counters
   a. Optech Model 400-C Ballot Tabulation Machines, Version 2.02,

      i. Chassis S/N 200209
      ii. Software
         1) Window 98, Second Edition
         2) Sequoia Pacific Election Tabulating Program (WinETP).Rel. 1.10.5
         3) 400C Diagnostics (not tested)
         4) 400D Sort (not tested)
         5) First Security Agent
         6) (no anti-virus)
   b. Optech Eagle III-P,
      i. S/N 415709
      ii. Firmware
   c. Optech Insight (two)
      i. S/N:
         1) 500923
         2) 501513
      ii. Firmware
         1) APX K2.06.021108.1600
         2) HPX K/K1.40.021030.1110
         3) CPX J/K1.12.020412.1100

2. Central Workstation
   a. Dell Latitude CPx,500GT, (Server/Workstation for the EMS/Aero software and master WinETP) Service Tag 13DHF31
      i. Intel Pentium IV 2.40 GHz
      ii. 256 MB DIMM
      iii. Maxtor 6E040L0 41.11 GB Hard Drvie
      iv. USB DISK 2.0 USB Device ports
      v. HL-DT-ST CD-RW CDROM Drive
      vi. 3.5 Diskette Drive
   b. Base Installed Software
      i. Windows 2000 Professional. (Build 2195)
         1) No Microsoft patches to Windows 2000 were installed.

ii. Symantec AntiVirus Version 9.0.0.338
iii. First Security Agent
----The following applications were installed for data capture during the test and are not part of the standard installation
iv. Belarc, Inc. - BelManage Client Version 6.0n
v. GEMMICO™ FolderInfo Version 2.4.1

c. Sequoia Voting System application software
i. Election Management System (EMS) Version 3.54.1 Rev 2.06.03 (Build 3.54.4.07.12)
ii. Automatic Election Returns Operation (AERO) Version 3.54.1 Rev 2.09.16 (Build 3.54.4.07.12)
iii. WinETP 1.10.5
iv. Sequoia Voting Systems - SPRHost Version 1.0.0.0
v. Liant Software Corporation's RM/Cobol Rev. 7.00:03 (required third-party COBOL runtime interpreter used by WinETP).

3. Other Equipment
a. Telephone Simulator
i. Model: MicroSeven, MiniPBX Simulator 8 line
ii. S/N 4195332
b. US Robotics Fax Modem 56K
i. S/N 225B6CGAJLUS

Test Elections

The test elections used are an update to the standard test elections used last year. The new Primary test election exercises the involvement of multiple political parties in the primary, matching the 2004 Primary party involvement more closely and using candidates from that election. The General election included minor party candidates added to the contest for President as well as other contests which had candidates in the actual 2004 General election (although not necessarily the same candidates in the same contests). The number of races and candidates were increased to 56 and 154 respectively with additional measures added to help ensure double sided ballots were tested. The test elections exercised:

- General Election contests,
- Primary Election,
- Primary party contests in six parties, two major and four minor,
- Non-partisan contests,
- "Do Not Specify" Primary party reporting in three parties,
- Exclusion of the Presidential nominee contest from DTS reporting in one party which otherwise reported DTS voting in other partisan contests,
- A split precinct,
- A selection of voting districts representing a mix of Federal, statewide, judicial, regional and local contests and the related rotations of candidates by Assembly District,
- Attempt to overrun Candidate name field length
- Attempt to overrun Contest name field length
- A contest with votes for more than one,

- Statewide and local measures,
- Double sided ballots,
- Blank ballots on both the Optech 400-C and the precinct tabulators,
- Overvoted races on both the Optech 400-C and the precinct tabulators,
- Unvoted Contest Warnings on the Optech Insight (a new feature),
- Uploading results by MPR,
- Uploading results by SPR-Host using modems from more than one precinct tabulator,
- Checking for detection and recovery of interruptions to the modem operations,
- Reports using the Optech 400-C WinETP (for the Optech 400-C only),
- Consolidating results from an Optech 400-C and multiple Optech precinct tabulators (both Insight and Eagle).

Election Divisions by Precinct

	Precinct	1	2		3	4	5	6	7	8	9	10
Type	**Split**		1	2								
SW	Presidential	x	x	x	x	x	x	x	x	x	x	x
SW	Federal, State , Court	x	x	x	x	x	x	x	x	x	x	x
SD	CONGRESS 49	x	x	x								
SD	CONGRESS 50				x	x						
SD	CONGRESS 51						x	x				
SD	STATE SENATE 35	x					x					x
SD	STATE SENATE 37		x					x				
SD	STATE SENATE 39				x					x		
SD	ASSEMBLY 66	x						x				
SD	ASSEMBLY 74		x	x					x			
SD	ASSEMBLY 75				x					x		
SD	ASSEMBLY 76					x					x	
SD	ASSEMBLY 77						x					x
U	COUNTY, Unincorporated		x					x				
C	CHULA VISTA			x								
C	LEMON GROVE	x										
R	PORTER VISTA					x						

C city, M Military, R unincorporated remainder of county, U Unincorporated place in a county.

Political Parties	*Abbrev.*	*Major*	*Minor*	*DTS*
American Independent	AI		x	X
Democrat	DEM	x		X
Green	GRN		x	
Libertarian	LIB		x	
Natural Law	NL		x	
Peace & Freedom	PF		x	
Republican	REP	x		X, except Presidential race